

Reduced-Capacitance Bus Switch in Isolated P-Well Shorted to Source and Drain During Switching

Abstract

A bus switch has reduced input capacitance. Parasitic source-to-well and drain-to-well capacitors are shorted by well-shortening transistors, eliminating these parasitic capacitances. The well-shortening transistors are turned on when the bus-switch transistor is turned on, but are turned off when the bus-switch transistor is turned off and the bus switch isolates signals on its source and drain. The isolated P-well under the bus-switch transistor and the well-shortening transistors is not tied to ground. Instead the isolated P-well is floating when the bus-switch transistor is turned on. When the bus-switch transistor is turned off, the underlying isolated P-well is driven to ground by a biasing transistor in another P-well. Since the isolated P-well has a much lower doping than the N+ source and drain, the capacitance of the well-to-substrate junction is much less than the source-to-well capacitance. Thus input capacitance is reduced, allowing higher frequency switching.